<u>WHAT IS CLAIMED IS</u>:

1. A device to analyze or reconstruct one or more signals I_j coming from one or more light sources, comprising at least:

- means to separate the signals I_j into at least two signals I_{j1} and I_{j2},
- at least two channels V_1, V_2 respectively possessing a gain G_1, G_2 and a dynamic range D_1, D_2, said channels having at least one sensor and being adapted to obtain, at output, a signal I'_{j1}, I'_{j2} with amplitudes $A_{j1}(t)$, $A_{j2}(t)$,
- a device for the processing of the signals I'_{j1}, I'_{j2} adapted to memorizing the amplitude $A_{j1}(t)$, $A_{j2}(t)$ of at least one of the two signals I'_{j1}, I'_{j2} when I'_{j1} and/or I'_{j2} is below a threshold value S_{max} and to determining the amplitude $A_j(t)$ of the corresponding signal I'_j.

2. A device according to claim 1, wherein the signal-processing device works as follows:

for a signal I'_j corresponding to a given spatial position j

- if the amplitude $A_{j1}(t)$ is smaller than or equal to a threshold value S_{max} then the processing device stores the pair of values $(A_{j1}(t), t)$,
- if the amplitude $A_{j1}(t)$ is greater than the threshold value S_{max}, then the processing device stores the pair of values $(A_{j2}(t), t)$ and
- from the stored values $(A_{j1}(t), t)$, $(A_{j2}(t), t)$ the device determines the corresponding values of amplitude $A_j(t)$ in order to obtain the signal I'_j.

3. A device according to one of the claims 1 or 2, wherein said means of separating the signal I_j have an attenuation coëfficient K determined so that K is smaller than or equal to the dynamic range of at least one of said channels V_1, V_2.

4. A device according to claim 3, wherein the means of separation have a value of attenuation coefficient K substantially equal to the dynamic range of at least one of said channels V_1, V_2.

5. A device according to one of the claims 1 to 4, wherein the sensors are streak cameras.

6. A device according to one of the claims 1 to 5, comprising n channels having a dynamic range D_n, (n-1) means of separating the signal or signals I_j.

7. A streak camera with wide dynamic range according to one of the claims 1 to 6.

8. A method to analyze a signal I_j with a wide dynamic range, wherein it comprises at least the following steps:

(a) separating the signal to be analyzed into at least two signals I_{j1}, I_{j2},

(b) making each signal I_{j1}, I_{j2} go through at least one channel V_1, V_2 comprising at least one sensor, each of the channels having a dynamic range D_1, D_2,

(c) memorizing each signal I'_{j1} and I'_{j2} coming from the two channels V_1 and V_2 in digital form so as to obtain, for an index j, the values of the corresponding amplitudes $A_{j1}(t)$ and $A_{j2}(t)$,

(d) reading the values $A_{j1}(t)$ and comparing each of the values with a threshold value S_{max},

(e) if Aj1(t) is smaller than the threshold value S_{max}, memorizing the value of the amplitude $A_{j1}(t)$ and the corresponding instant t,

(f) if $A_{jl1}(t)$ is greater than the threshold value S_{max}, then memorizing the value $A_{j2}(t)$ and the corresponding instant t,

(g) determining the resultant amplitude signal $A_j(t)$ from the pairs of values having an amplitude $[(A_{j1}(t), t); (A_{j2}(t), t)]$.

9. A method according to claim 8 wherein the signal is split up into several signals I_j with j varying spatially, and wherein the steps (a) to (g) are reiterated for each of the values of j.

10. A method according to one of the claims 8 and 9 wherein the threshold value S_{max} corresponds to the value of saturation of the sensor with the smallest dynamic range.

11. A method according to one of the claims 8 to 10, wherein a sensor comprises a streak camera.

12. A method according to one of the claims 8 to 10, wherein the signal to be analyzed I_j corresponds to the projection of a single laser beam through a slot.

13. A method according to one of the claims 8 to 10, wherein the analyzed signal I_j is a linear image coming from a spectrometer or the section of a physical phenomenon.

14. A method according to one of the claims 8 to 10, wherein the signal to be analyzed I_j is a signal formed by a row of optic fibers, each of the fibers producing a signal having an index j.